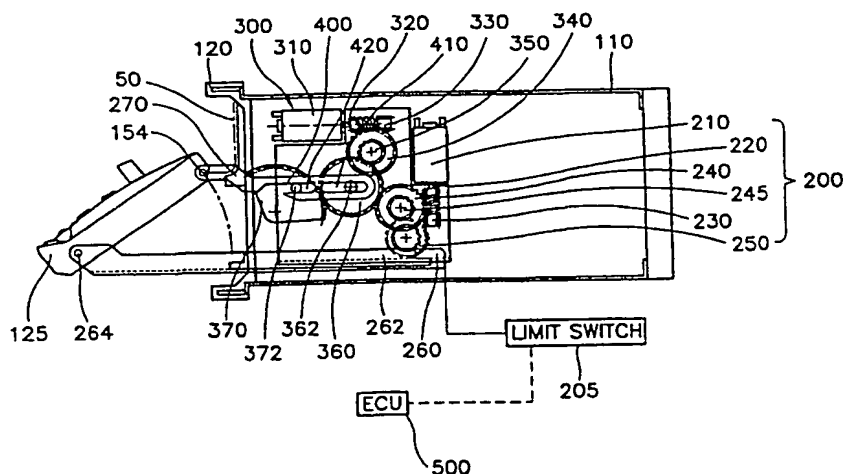


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(54) Title: DUAL MODE CAR STEREO SYSTEM CAPABLE OF PLAYING TWO DIFFERENT TYPES OF RECORDING MEDIUMS



A dual mode car stereo system (100) capable of maximizing a size of a display portion (140) of a front panel (125). The dual mode car stereo system (100) has a body (110) inserted into a cartridge, a frame (120) formed at a front portion thereof with record medium insertion holes (122), (126), a front panel (125) installed at the front portion of the frame (120) and slidably moving along the front portion of the frame, a first tilting mechanism (200) for tilting the front panel (125) with respect to the frame by a first tilting angle or for returning the tilted front panel to an initial position thereof, a second tilting mechanism for tilting the front panel (125) with respect to the frame by a second tilting angle and for returning the front panel being tilted by the second tilting angle to the first tilting angle, a pair of ribs (270) for guiding the tilting movement of the front panel, and a limit switch (205) detecting the front panel when the front panel (125) is tilted at the first tilting angle and sending an electric signal to an electric control unit (500). The dual mode car stereo system can minimize an internal space thereof and can maximize a size of a display portion.

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DUAL MODE CAR STEREO SYSTEM CAPABLE OF PLAYING TWO
DIFFERENT TYPES OF RECORDING MEDIUMS

TECHNICAL FIELD

5 The present invention relates to a car stereo system,
and more particularly to a dual mode car stereo system
capable of playing two different types of recording
mediums and maximizing a size of a display portion
provided in a front panel.

10

BACKGROUND ART

 Generally, a car is equipped with audio instruments
such as a radio, a cassette player, a compact disc player
and the like. Such audio instruments are installed on a
15 dash board formed in front of a driver's seat so as to
allow a driver to easily operate the audio instruments.

 FIG. 1 shows a conventional car stereo system 10. As
shown in FIG. 1, conventional car stereo system 10 has a
body 1 accommodated in a cartridge formed in a car body.
20 Body 1 is provided at a front surface thereof with a frame
2 in which a front panel 12 is installed. Front panel 12
has a plurality of knobs 3 and operating buttons 7 for
selecting various functions of car stereo system 10. In
addition, front panel 12 is formed with a liquid crystal
25 display portion 4 for displaying frequencies or operating
modes thereof and a tape insertion hole 5.

 However, in conventional car stereo system 10, if sun
light is projected into display portion 4, it is difficult
for the driver to view characters being displayed on

display portion 4.

In addition, since tape insertion hole 5 and display portion 4 are formed in front panel 12 in conventional car stereo system 10, a size of display portion 4 is limited.

5 Particularly, in a dual mode car stereo system which reproduces both a compact disc and a magnetic tape, a compact disc insertion hole should be formed in front panel 12 so that the size of display portion 4 is more limited.

10 In order to solve the above problems, various kinds of car stereo systems, in which disc insertion holes are formed at a front surface of a frame instead of a front panel so as to provide a sufficient space on the front panel, are suggested.

15 For example, U.S. Patent No. 5,815,468 issued to Muramatsu discloses a car stereo system in which a tape insertion hole and a compact disc hole are formed at a frame.

In the above patent, a front panel is downwardly
20 moved by a slide member so that insertion holes formed at a front surface of the frame are exposed. A lower end of the front panel is pivotably coupled to a front end of the slide member and a rack is formed at one side of the slide member. The rack is engaged with gears rotated by a motor,
25 so the slide member is linearly reciprocated when the motor is driven. Accordingly, the front panel downwardly moves or returns to its initial position in accordance with the driving direction of the motor.

However, in Muramatsu's car stereo, the front panel is opened by the slide member, so a lengthy slide member is required to completely open the front panel. In addition, an internal space of a body should be large in order to accommodate the lengthy slide member so that the size of the car stereo becomes large.

DISCLOSURE OF INVENTION

The present invention has been made to overcome the above described problems of the prior arts, and accordingly it is an object of the present invention to provide a dual mode car stereo system which has a compact size and can maximize a size of a display portion.

To achieve the above object, the present invention provides a car stereo system comprising:

- a body inserted into a cartridge formed in a dash board of a car;

- a frame installed at a front surface of the body and formed at a front portion thereof with record medium insertion holes;

- a front panel installed at the front portion of the frame, an upper portion of the front panel slidably moving along the front portion of the frame from an upper portion of the frame to a lower portion of the frame and vice versa so that the front panel performing a tilting movement with respect to the frame;

- a first means for tilting the front panel with respect to the frame by a first tilting angle or for

returning the tilted front panel to an initial position thereof;

a second means for tilting the front panel with respect to the frame by a second tilting angle and for
5 returning the front panel being tilted by the second tilting angle to the first tilting angle;

a third means for guiding the front panel being tilted by the first means;

a limit switch for detecting the front panel when the
10 front panel is tilted at the first tilting angle by the first means; and

an electric control unit for sequentially operating the first and second means, the electric control unit stopping an operation of the first means and operating the
15 second means when an electric signal is inputted thereto from the limit switch.

According to the preferred embodiment of the present invention, first means includes a first gear-motor assembly fixedly attached to an inner side wall of the
20 body, and a pair of moving members which are linearly reciprocated according to a driving direction of the gear-motor assembly. The pair of moving members are positioned at an inner lower portion of the body. Front ends of moving members are connected to both lower side ends of
25 the front panel by a pair of hinge pins. One of moving members is formed with a rack gear which is engaged with the first gear-motor assembly.

The second means includes a second gear-motor

assembly and a hanger having a first end coupled to the second gear-motor assembly and a second end opposite to the first end and hinged to a first upper side wall of the front panel by a hinge pin. The hanger is horizontally
5 maintained when the front panel is tilted at the first tilting angle by the first means and is pivotably moved up and down according to a driving direction of the second gear-motor assembly thereby moving the upper portion of the front panel upward and downward with respect to the
10 frame.

The third means includes first and second ribs which are vertically formed at both side ends of the front portion of the frame. Lower ends of the first and second ribs are bent at an angle of 90 degrees with respect to
15 the front portion of the frame. The first and second ribs are formed at a center thereof with first and second guide slots.

BRIEF DESCRIPTION OF THE DRAWINGS

20 The above object and other advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings, in which:

FIG. 1 is a perspective view showing a conventional
25 car stereo system;

FIG. 2 is a perspective view showing a dual mode car stereo system according to one embodiment of the present invention;

FIG. 3 is a side sectional view of the car stereo system shown in FIG. 2;

FIG. 4 is a side sectional view of the car stereo system when a front panel is tilted at a first angle;

5 FIG. 5 is a front view of the car stereo system shown in FIG. 4;

FIG. 6 is a side sectional view of the car stereo system when a front panel is tilted at a second angle; and

10 FIG. 7 is a front view of the car stereo system shown in FIG. 6.

BEST MODE FOR CARRYING OUT THE INVENTION

Hereinafter, the present invention will be described in detail with reference to the accompanying drawings.

15 FIGS. 2 to 7 show a dual mode car stereo system 100 according to the preferred embodiment of the present invention.

FIG. 2 is a perspective view of dual mode car stereo system 100, FIGS. 3, 4 and 6 are operational views of dual
20 mode car stereo system 100, and FIGS. 5 and 7 respectively show front views shown in FIGS. 4 and 6.

In this application, the dual mode car stereo system means a system capable of selectively playing a compact disc and a magnetic tape and is simply referred to as a
25 car stereo system hereinbelow.

As shown in FIG. 2, car stereo system 100 has a body 110 inserted into a cartridge formed in a dash board of a car. A frame 120 is installed at a front surface of body

110 and a front panel 125 performing a tilting movement is installed at the front portion of frame 120. Front panel 125 is provided with a plurality of knobs 130 and operating buttons 170 for selecting various functions of car stereo system 100. In addition, front panel 125 is formed with a liquid crystal display portion 140 for displaying frequencies or operating modes thereof.

Reference numerals 127 and 129 are first and second tilt buttons. When a user presses first tilt button 127, front panel 125 slidably moves along the front portion of frame 120 from an upper portion of frame 120 to a lower portion of frame 120. In addition, when the user presses second tilt button 129, front panel 125 returns to its initial position. According to another embodiment of the present invention, front panel 125 performs a tilting movement or a returning movement by a predetermined tilting angle whenever the user shortly presses first or second tilt button 127 or 129 once. In this case, front panel 125 can be maintained in a desired position according to the user's choice. Therefore, when sun light is projected into front panel 125, the user can view characters being displayed on display portion 140 by adjusting the tilting angle of front panel 125.

Referring to FIG. 7, frame 120 is formed with a compact disc insertion hole 122 and a tape insertion hole 126. Reference numerals 124 and 128 are eject buttons for ejecting the compact disc or the tape from car stereo system 100. By providing compact disc insertion hole 122

and tape insertion hole 126 at frame 120 instead of front panel 125, the size of display portion 140 can be maximized.

Referring to FIG. 3, a first tilting mechanism for
5 tilting front panel 125 with respect to frame 120 at an angle of 45 degrees or for returning tilted front panel 125 to an initial position thereof is installed in body 110. The first tilting mechanism includes a first gear-motor assembly 200 fixedly attached to an inner side wall
10 of body 110 and a pair of moving members 260 which are linearly reciprocated according to a driving direction of gear-motor assembly 200.

The pair of moving members 260 are positioned at an inner lower portion of body 110. Front ends of moving
15 members 260 pass through frame 120 and are connected to both lower side ends of front panel 125 by a pair of hinge pins 264. In addition, rear ends of moving members 260 are connected to each other by a wire member (not shown). One of moving members 260 is formed with a rack gear 262 which
20 is engaged with first gear-motor assembly 200.

First gear-motor assembly 200 includes a first reversible motor 210 installed at the inner side wall of body 110, a first worm gear 230 integrally coupled to a rotating shaft 220 of first reversible motor 210, a first
25 gear 240 engaged with first worm gear 230 for receiving a rotational force therefrom, a second gear 245 integrally formed on an upper surface of first gear 240, and a third gear 250 disposed between second gear 245 and rack gear

262 for transferring the rotational force of second gear 245 to rack gear 262. Second gear 245 has a diameter smaller than diameters of first and third gears 240 and 250. Accordingly, second gear 245 reduces the rotational force of first reversible motor 210 so that the tilting movement of front panel 125 is smoothly carried out.

In addition, a second tilting mechanism for tilting front panel 125 with respect to frame 120 at an angle of 90 degrees and for returning tilted front panel 125 to its initial position is provided in body 110.

The second tilting mechanism includes a second gear-motor assembly 300 and a hanger 400 having a first end coupled to second gear-motor assembly 300 and a second end opposite to the first end and hinged to an upper side wall of front panel 125.

Second gear-motor assembly 300 includes a second reversible motor 310 installed at an upper portion of the inner side wall of body 110, a second worm gear 330 integrally coupled to a rotating shaft 320 of second reversible motor 310, a fourth gear 340 engaged with second worm gear 330 for receiving a rotational force therefrom, a fifth gear 350 integrally formed on an upper surface of fourth gear 340, a sixth gear 360 engaged with fifth gear 350 for receiving a rotational therefrom and provided at a center thereof with a first pin 362, and a fan shaped gear 370 having a second pin 372 at a periphery thereof.

Like second gear 245, fifth gear 350 has a diameter

smaller than diameters of fourth and sixth gears 340 and 360. Accordingly, fifth gear 350 reduces the rotational force of second reversible motor 310 so that the tilting movement of front panel 125 is smoothly carried out.

5 The second end of hanger 400 is hinged to an upper side wall of front panel 125 by a hinge pin 154. As detailedly shown in FIG. 4, when front panel 125 has been moved by the first tilt mechanism, hanger 400 is horizontally maintained. In this state, hanger 400 is
10 pivotably moved up and down according to the driving direction of second gear-motor assembly 300 thereby moving the upper portion of front panel 125 upward and downward with respect to frame 120.

 The first end of hanger 400 is formed with an
15 elongated hole 410 into which first pin 362 of second gear 245 is inserted and the center of hanger 400 is formed with an opened elongated hole 420 into which second pin 372 of fan shaped gear 370 is inserted when front panel 125 has been tilted by the first tilt mechanism.

20 On the other hand, car stereo system 100 further includes first and second ribs 270 which are vertically formed at both side ends of the front portion of frame 120 for guiding the tilting movement of front panel. Lower ends of first and second ribs 270 are bent at an angle of
25 90 degrees with respect to the front portion of frame 120. In addition, as shown in FIGs. 5 and 7, first and second ribs 270 are formed at a center thereof with a pair of guide slots 275.

The second end of hanger 400 is disposed in one of guide slots 275 and moves along the slot. In addition, an engagement pin 277 is provided at a rear portion of front panel 125 in opposite to hanger 400. Engagement pin 277 is
5 slidably inserted into the other guide slot. Accordingly, when the second end of hanger 400 coupled to one end of front panel 125 moves along one guide slot, engagement pin 277 also moves along the other guide slot.

FIGs. 4 and 6 show a tilting route 50 of front panel
10 125. As shown in the figures, the upper portion of front panel 125 is vertically moved, and then is horizontally moved at the lower end of slots 275. After that, the upper portion of front panel 125 is moved down in a curvilinear motion. This is called "tilting movement" of front panel
15 125.

In addition, car stereo system 100 further includes a limit switch 205 for detecting front panel 125 when front panel 125 has been tilted at an angle of 45 degrees by the first tilt mechanism. Limit switch 205 sends an electric
20 signal to an electric control unit 500. Upon receiving the electric signal from limit switch 205, electric control unit 500 stops the operation of first reversible motor 210 and operates second reversible motor 310.

Car stereo system 100 having the above construction
25 operates as follows.

Firstly, when the user wishes to listen to the music recorded in the cassette tape or compact disc, the user presses first tilt button 127. Then, electric control unit

500 connected to first tilt button 127 operates first reversible motor 210 in the forward direction.

The rotational force of first reversible motor 210 is transferred to rack gear 262 of moving member 260 through
5 rotating shaft 220, first worm gear 230, first gear 240, second gear 245 and third gear 250 so that moving member 260 is linearly moved out of body 110.

Moving members 260 are coupled to the lower portion of front panel 125 by hinge pins 264, so the lower portion
10 of front panel 125 moves outwardly as moving members 260 move toward the exterior of body 110. At this time, the second end of hanger 400 coupled to the upper side wall of front panel 125 is vertically moved along guide slot 275 of guide rib 270.

15 When the second end of hanger 400 reaches the lower end of guide rib 270, hanger 400 is horizontally maintained. At this time, second pin 372 of fan shaped gear 370 is in line with opened elongated hole 420 of hanger 400.

20 Then, the second end of hanger 400 horizontally moves along the bending portion of guide rib 270 so that second pin 372 of fan shaped gear 370 is inserted into opened elongated hole 420 of hanger 400 as shown in FIG. 4.

At this time, limit switch 205 makes contact with
25 moving members 260 and sends the electric signal to the electric control unit. Upon receiving the electric signal from limit switch 205, electric control unit 500 stops first reversible motor 210 and operates second reversible

motor 310.

The rotational force of second reversible motor 310 is transferred to fan shaped gear 370 through rotating shaft 320, second worm gear 330, fourth gear 340, fifth gear 350 and sixth gear 360, thereby rotating fan shaped gear 370.

Since second pin 372 of fan shaped gear 370 is inserted into opened elongated hole 420 of hanger 400, hanger 400 is pivotally moved about second pin 372 as fan shaped gear 370 rotates. That is, the second end of hanger 400 is moved downward about second pin 372 so that front panel 125 is fully opened as shown in FIG. 6.

At this time, as shown in FIG. 7, disc insertion hole 122 and tape insertion hole 126 formed on frame 120 are exposed. In this state, the user inserts a record medium such as a compact disc or cassette tape into disc insertion hole 122 or tape insertion hole 126.

When the record medium has been inserted into one of disc insertion hole 122 or tape insertion hole 126, a separate loading apparatus is driven for loading the record medium onto an operating position and front panel 125 returns to its initial position as shown in FIG. 3. In order to return front panel 125 to its initial position, the user presses second tilt button 129.

However, according to another embodiment of the present invention, sensors which detect the cassette tape or compact disc can be installed in body 110 for returning front panel 125 to its initial position. In this case, the

sensor sends an electric signal to electric control unit 500 when the cassette tape or compact disc has been loaded on the operation position. Upon receiving the electric signal from the sensor, electric control unit 500
5 sequentially operates first and second reversible motors 210 and 310.

When front panel 125 is returned to the initial position, first and second reversible motors 210 and 310 are driven in the reverse direction. The mechanism for
10 returning front panel 125 to the initial position is contrary to the mechanism for tilting front panel 125, so it will not be further explained below.

Although first and second reversible motors 210 and 310 are described as they are sequentially operated, the
15 present invention is not limited to that scope. According to another embodiment of the present invention, it is possible to selectively operating first and second reversible motors 210 and 310. That is, if the user wishes to listen to the music recorded in the compact disc, there
20 is no need to expose tape insertion hole 126.

Therefore, according to another embodiment of the present invention, when the user shortly presses first tilt button 127 once, the first tilt mechanism is operated. On the other hand, when the user presses long first tilt button
25 once, the first and second tilt mechanisms are sequentially operated. In this case, an energy loss is prevented and a lift span of car stereo system is extended.

As described above, since the disc insertion hole and cassette insertion hole are formed in the frame instead of the front panel, the size of the display portion formed in the front panel can be maximized.

5 In addition, the car stereo system of the present invention can adjust the tilting angle of the front panel, so the driver can view the characters displayed on the display portion even when sun light is projected into the front panel.

10 Furthermore, the car stereo system can miniaturize an internal space of the body so that the size of the body can be minimized.

While the present invention has been particularly shown and described with reference to the preferred
15 embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be effected therein without departing from the spirit and scope of the invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. A car stereo system comprising:
 - a body inserted into a cartridge formed in a dash
5 board of a car;
 - a frame installed at a front surface of the body and
formed at a front portion thereof with record medium
insertion holes;
 - a front panel installed at the front portion of the
10 frame, an upper portion of the front panel slidably moving
along the front portion of the frame from an upper-portion
of the frame to a lower portion of the frame and vice
versa so that the front panel performing a tilting
movement with respect to the frame;
 - 15 a first means for tilting the front panel with
respect to the frame by a first tilting angle or for
returning the tilted front panel to an initial position
thereof;
 - a second means for tilting the front panel with
20 respect to the frame by a second tilting angle or for
returning the front panel being tilted by the second
tilting angle to the first tilting angle;
 - a third means for guiding the front panel being
tilted by the first means;
 - 25 a limit switch for detecting the front panel when the
front panel is tilted at the first tilting angle by the
first means; and
 - an electric control unit for sequentially operating

the first and second means, the electric control unit stopping an operation of the first means and operating the second means when an electric signal is inputted thereto from the limit switch.

5

2. The car stereo system as claimed in claim 1, wherein the front panel is provided at a front surface thereof with a first tilt button for operating the first means and a second tilt button for operating the second
10 means, the first and second tilt buttons being connected to the electric control unit.

3. The car stereo system as claimed in claim 1, wherein the first tilting angle is about 45 degrees and
15 the second tilting angle is about 90 degrees.

4. The car stereo system as claimed in claim 1, wherein the first means includes a first gear-motor assembly fixedly attached to an inner side wall of the
20 body, and a pair of moving members which are linearly reciprocated according to a driving direction of the gear-motor assembly, the pair of moving members being positioned at an inner lower portion of the body, front ends of the moving members being connected to both lower
25 side ends of the front panel by a pair of hinge pins, one of the moving members being formed with a rack gear which is engaged with the first gear-motor assembly

5. The car stereo system as claimed in claim 4, wherein the first gear-motor assembly includes a first reversible motor installed at the inner side wall of the body, a first worm gear integrally coupled to a rotating shaft of the first reversible motor, a first gear engaged with the first worm gear for receiving a rotational force therefrom, a second gear integrally formed on an upper surface of the first gear, and a third gear disposed between the second gear and the rack gear for transferring the rotational force of the second gear to the rack gear.

6. The car stereo system as claimed in claim 5, wherein the second means includes a second gear-motor assembly and a hanger having a first end coupled to the second gear-motor assembly and a second end opposite to the first end and hinged to an upper side wall of the front panel by a hinge pin, the hanger being horizontally maintained when the front panel is tilted at the first tilting angle by the first means and being pivotably moved up and down according to a driving direction of the second gear-motor assembly thereby moving the upper portion of the front panel upward and downward with respect to the frame.

7. The car stereo system as claimed in claim 6, wherein the second gear-motor assembly includes a second reversible motor installed at an upper portion of the inner side wall of the body, a second worm gear integrally

coupled to a rotating shaft of the second reversible motor, a fourth gear engaged with the second worm gear for receiving a rotational force therefrom, a fifth gear integrally formed on an upper surface of the fourth gear, 5 a sixth gear engaged with the fifth gear for receiving a rotational force therefrom and provided at a center thereof with a first pin coupled to the first end of the hanger for guiding a pivot movement of the hanger, and a fan shaped gear having a second pin at a periphery thereof 10 which is coupled to a center of the hanger when the front panel is tilted at the first tilting angle by the first means and downwardly urges the hanger thereby tilting the front panel by the second tilting angle.

15 8. The car stereo system as claimed in claim 7, wherein the first end of the hanger is formed with an elongated hole into which the first pin of the second gear is inserted and the center of the hanger is formed with an opened elongated hole into which the second pin of the fan 20 shaped gear is inserted when the front panel is tilted by the first means.

9. The car stereo system as claimed in claim 6, wherein the third means includes first and second ribs 25 which are vertically formed at both side ends of the front portion of the frame, lower ends of the first and second ribs being bent at an angle of 90 degrees with respect to the front portion of the frame, the first and second ribs

being formed at a center thereof with first and second guide slots.

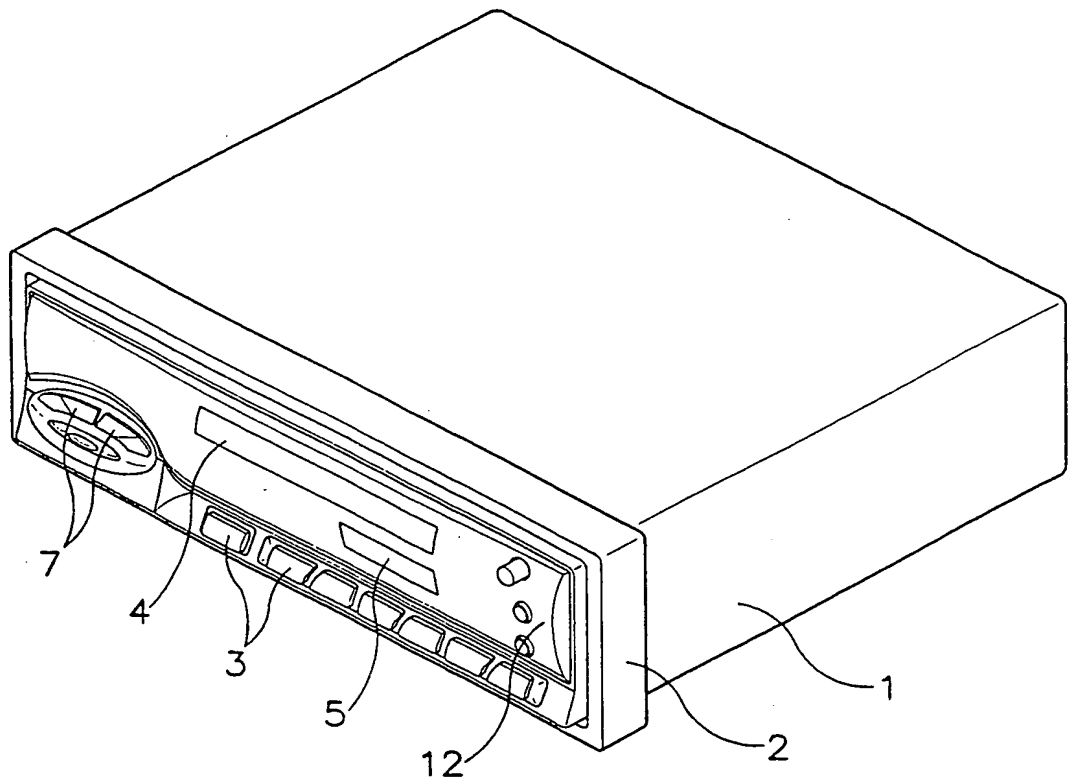
10. The car stereo system as claimed in claim 9,
5 wherein the second end of the hanger is disposed in the first guide slot and moves along the first guide slot.

11. The car stereo system as claimed in claim 10,
wherein an engagement pin is provided at a rear portion of
10 the front panel in opposite to the hanger, the engagement pin being slidably inserted into the second guide slot.

1/6

FIG. 1
(PRIOR ART)

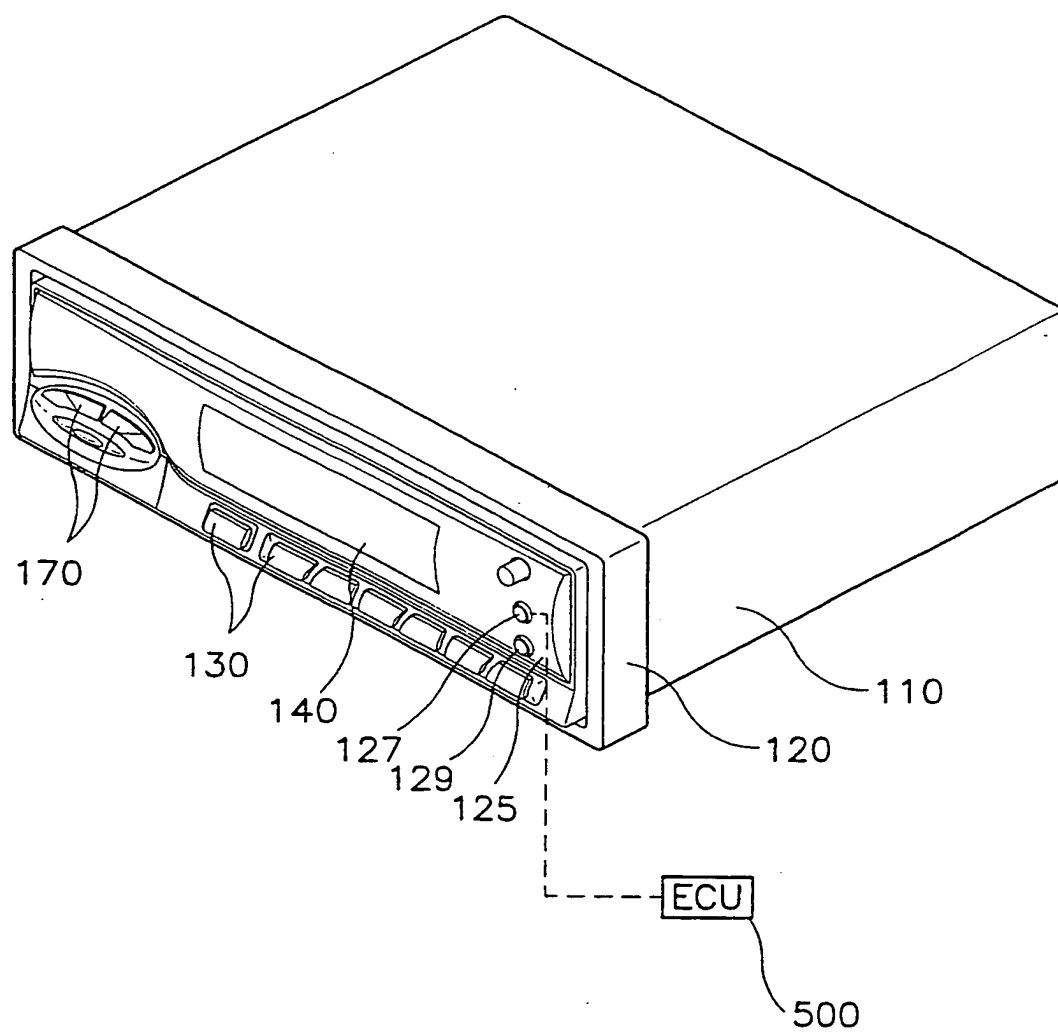
10



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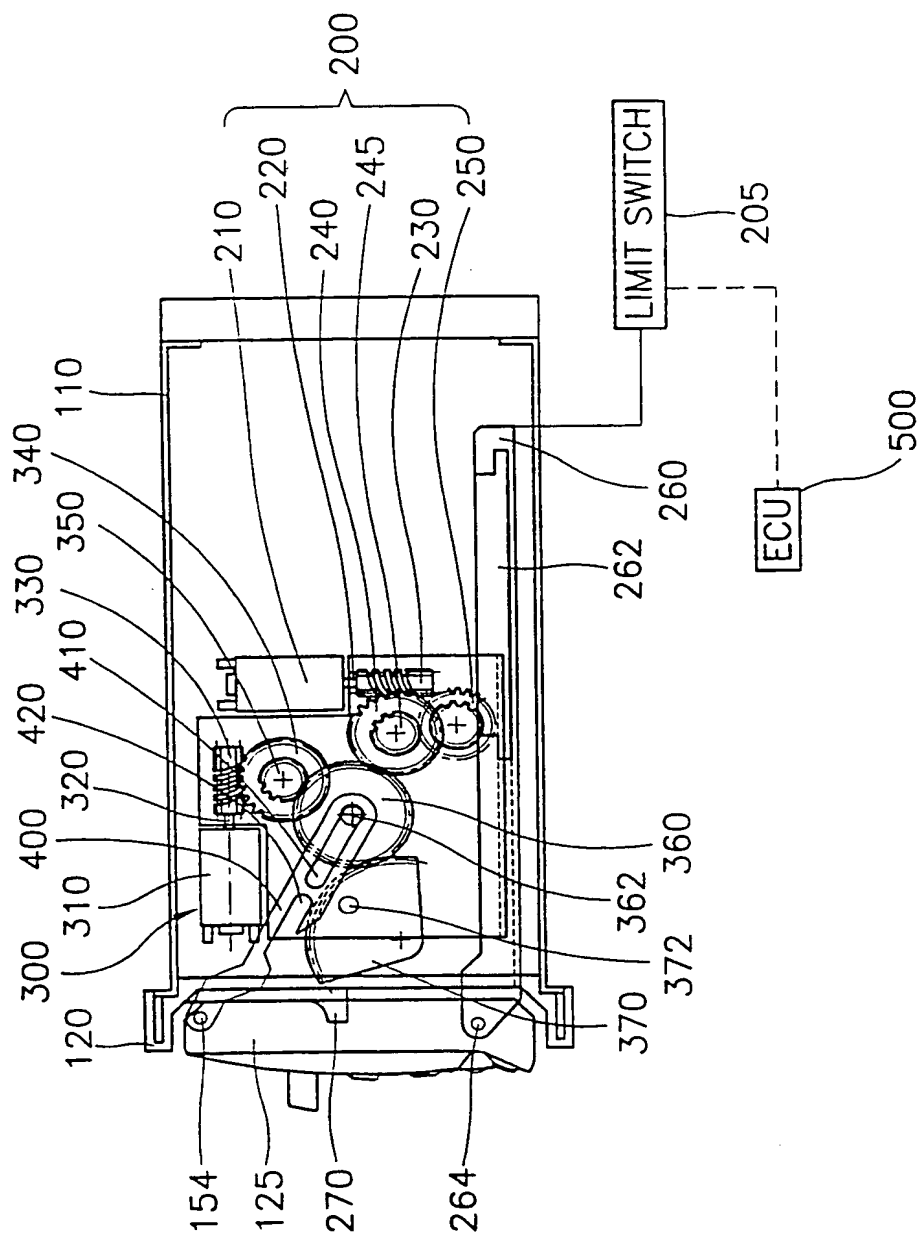
FIG. 2

100



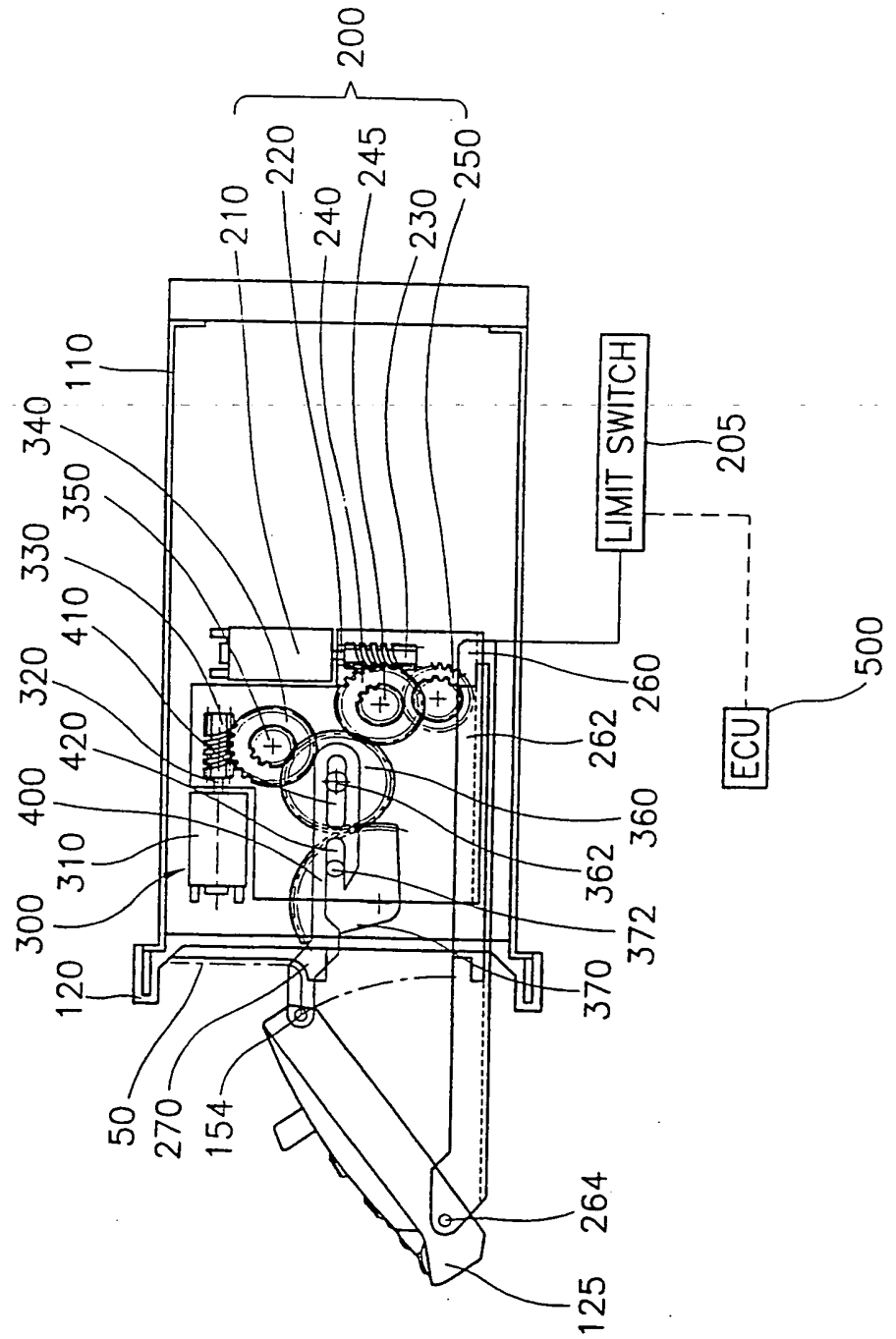
3/6

FIG. 3



4/6

FIG. 4



5/6

FIG. 5

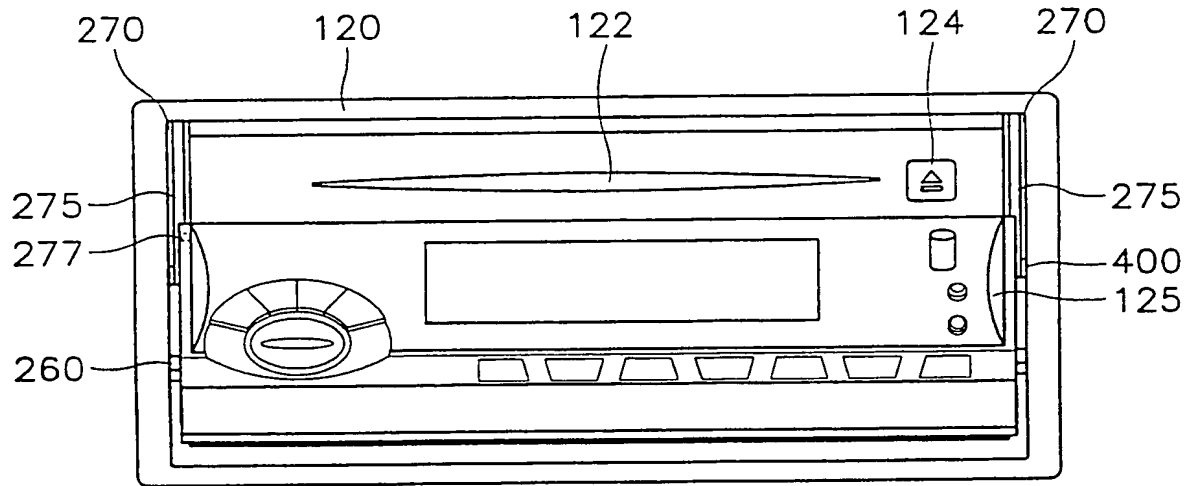
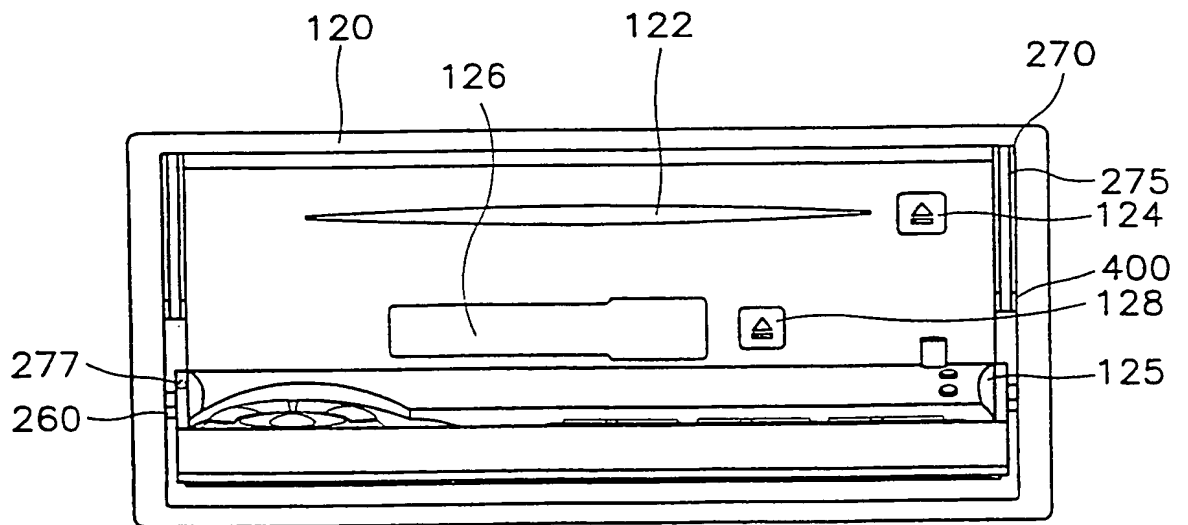
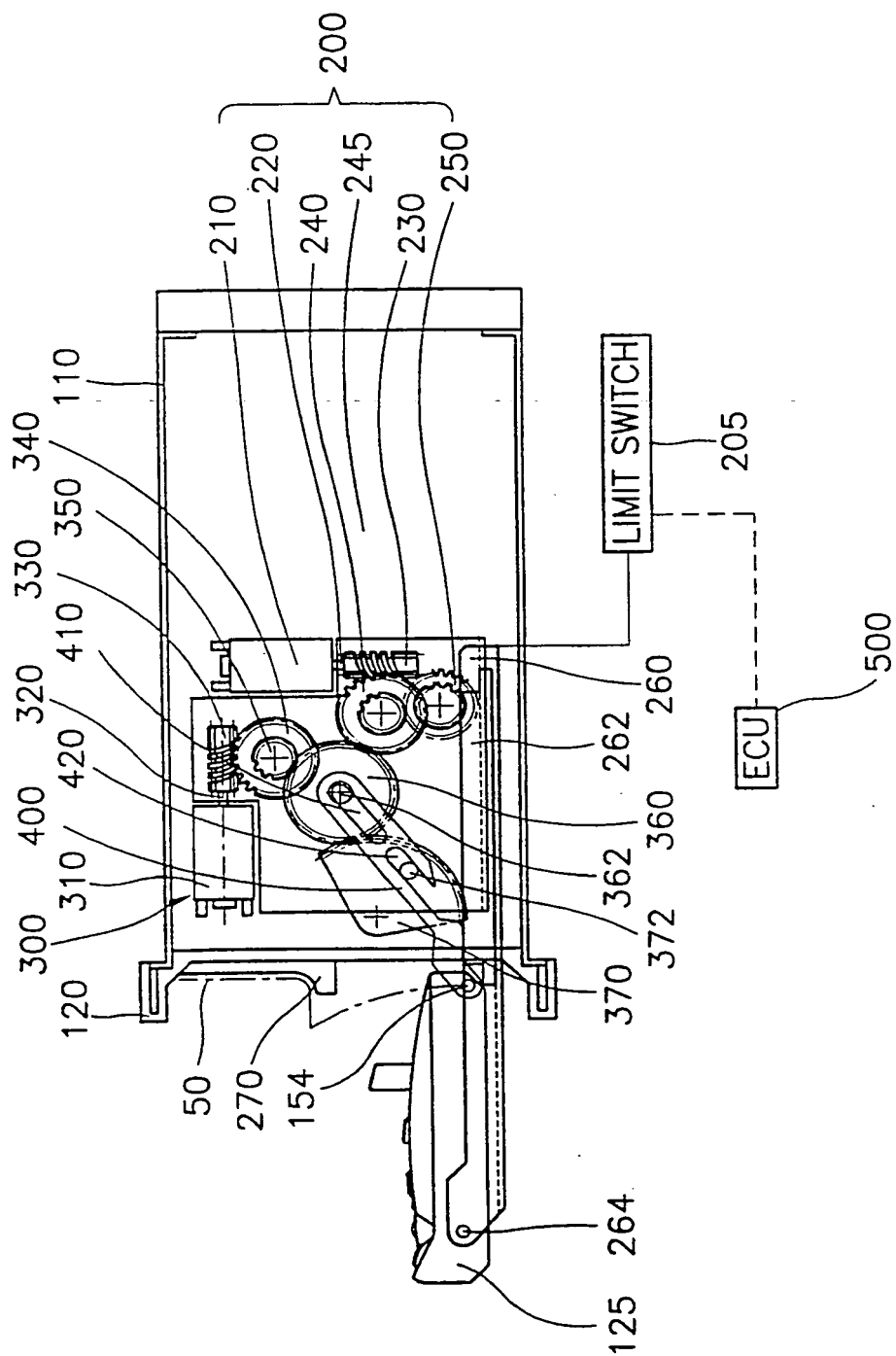


FIG. 7



66



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00139

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁶: B 60 R 11/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁶: B 60 R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 169 113 A1 (REGIE NATIONALE DES USINES RENAULT), 22 January 1986 (22.01.86), fig.1,2.	1
A	DE 39 02 678 A1 (YAZAKI CORP.), 09 August 1990 (09.08.90), fig.5; abstract.	1
A	US 4 617 430 A (BRYANT), 14 October 1986 (14.10.86), fig.2; abstract.	1
A	US 5 815 468 A (MURAMATSU et al.), 29 September 1998 (29.09.98), fig.3,4; abstract.	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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